2024

AP® Human Geography

Sample Student Responses and Scoring Commentary Set 1

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Free-Response Question 1

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Question 1: No Stimulus — 7 points

(A) Define the concept of carrying capacity. — **1 point**

Accept one of the following:

- A1. The number of people a particular place, area, and/or the Earth can support.
- A2. Population size, distribution, and/or density affects how many people the environment and its natural resources can support.
- A3**.** The number of living organisms that an area or habitat can support without environmental degradation.
- A4. Changes in population density and/or population distribution may affect the capacity of the environment to meet the population's needs.

(B) Describe ONE way that humans have altered the environmental sustainability of agricultural lands. — **1 point**

Accept one of the following:

Decreased environmental sustainability

- B1. Overuse or use of synthetic fertilizers, pesticides, and/or herbicides that harm ecosystems (e.g., water, air, soil) and/or increase pollution.
- B2. Overuse or use of resources (e.g., water, air), reducing productivity.
- B3. Overuse, erosion, or nutrient depletion of soil, reducing productivity.
- B4. Overuse of irrigation, depleting water resources, reducing soil nutrients (via runoff), or contributing to soil salinization.
- B5. Agricultural practices (e.g., monocropping, commercial agriculture, increased use of high-yield seeds, GMOs, and/or biotechnology) have reduced biodiversity and/or depleted soil nutrients.

OR

Increased environmental sustainability

- B6. Improved management of farm resources (e.g., water, soil, fertilizers, pesticides) has helped ecosystems.
- B7. Use of organic agricultural practices, including natural fertilizers, pesticides, and/or herbicides.
- B8. Restoration of environmentally damaged areas by implementing sustainable agricultural practices.
- B9. Crop rotation which supports soil health (fertility) and/or avoids large-scale environmental damage.
- B10. Decreased irrigation and/or extraction of water from aquifers or groundwater resources.
- B11. Conservation of farmland (e.g., fallowing, erosion control) and/or local resources (e.g., water supplies, native species).

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(C) **Explain how transportation technology has increased economies of scale in the agricultural sector of less developed countries.** **1 point**

Accept one of the following:

- C1. Trucks, trains, and/or shipping containers can move large and/or larger quantities of crops, increasing production and/or consumption.
- C2. Farm machinery (e.g., tractors, harvesters) has helped reduce the amount of human labor and/or increased the amount of production.
- C3. Farm machinery has allowed farms to increase the amount of farmland with reduced labor costs and/or improved efficiency.
- C4. Chemical herbicides, pesticides, and/or fertilizers applied by transportation technology (e.g., tractor, airplane) have reduced labor and/or increased crop yields.
- C5. Airplanes and/or ships are used to transport perishable products (e.g., flowers, fruits, vegetables), increasing their sales in other markets.

(D) **Explain a likely negative economic outcome of Green Revolution agricultural practices on rural communities.** **1 point**

Accept one of the following:

- D1. Pollution of water, air, and/or soil resources harms economic productivity or livelihoods.
- D2. Smaller farms may close, and/or farmers may sell land because they cannot compete with larger farms that can afford Green Revolution technologies.
- D3. Loss of agricultural jobs and/or loss of access to farmland may result in loss of income or migration (e.g., rural-to-urban).
- D4. Expensive farm inputs (e.g., high-yield seeds, agricultural chemicals, fossil fuels) increase the cost of agricultural production and/or reduce profits for farms.
- D5. Changes in land ownership (tenure), land use patterns, and/or agriculture-related jobs may economically disadvantage subsistence farmers.

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(E) **Explain ONE weakness of Malthusian theory in predicting the relationship between food production and population growth in contemporary society.** **1 point**

Accept one of the following:

- E1. Population growth has not outpaced food production, and/or populations have not run out of food.
- E2. Malthusian theory did not consider changing social, political, and/or economic factors that decrease fertility.
- E3. Improvements in agricultural technology (e.g., mechanization, Green Revolution) increased food production at a rate that outpaced population growth.
- E4. Advances in transportation have improved the global distribution of food.
- E5. The challenges of feeding the world's population have led to the opening of new agricultural lands or the development of new technologies that overcome the constraints of the environment and/or produce more food.
- E6. Farmers learned to farm more intensively with new agricultural practices and/or technologies to increase yields, increase carrying capacity, or increase the amount of cultivated land.
- E7. Growing populations have more resources to problem-solve and/or develop new methods of increasing food supplies.
- E8. Growing populations can move to areas with food surpluses or move away from areas of food insecurity.

(F) **Explain how surplus food production has changed the global market for local agricultural products.** **1 point**

Accept one of the following:

- F1. Consumption patterns, changed diets, and/or increased popularity of certain foods (e.g., local foods, seasonal crops, specialty crops) have expanded the global sales of these foods.
- F2. Surplus food drives global prices down, resulting in less expensive items, higher sales or exports, and/or increased competition with other goods.
- F3. Increasing global sales of popular crops can increase local farm profitability, increase local investment, and increase or decrease the number or type of local products for sale (e.g., value-added products, value-added specialty crops).

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(G) **Explain the degree to which Green Revolution agricultural practices were effective in reducing hunger in less developed countries. (Response must indicate the degree [low, moderate, high] and provide an explanation.)** **1 point**

Statement of a moderate or high degree

AND

Supported by one of the following:

- G1. Food production increased due to high-yield seeds, chemical fertilizers, pesticides, irrigation, and/or mechanization.
- G2. Crop surpluses reduced food prices, making food items more accessible and/or more affordable.
- G3. More agricultural land came under cultivation, increasing food production.

OR

Statement of a moderate or low degree

AND

Supported by one of the following:

- G4. Green Revolution inputs (e.g., fertilizers, pesticides, high-yield seeds, irrigation, mechanization) were too expensive for many farmers, resulting in fewer farms and/or lower agricultural yields.
- G5. Irrigation systems led to the salinization of the soil, reducing food production.
- G6. The inputs (e.g., chemicals, fossil fuels) and/or land management techniques resulted in environmental degradation and/or abandonment of productive land, decreasing food production.

Total for question 1: 7 points

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Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1 ● Question 2 ○ Question 3 ○

Begin your response to each question at the top of a new page. Do not skip lines.

A Carrying capacity is the maximum amount of people that an area of land can support.

B Humans have made agricultural lands less sustainable through the use of artificial pesticides that alter the surrounding environment, including the soil composition and the health of ecosystems. Pesticides can harm wildlife as well.

C Transportation technology such as trucks, trains and boats have allowed less developed countries to sell their commodities abroad for a reasonable transport fee. Affordable product transportation makes producing a lot of a commodity cheaper, allowing LDCs to benefit from economies of scale.

D Rural communities tended to be skipped over during the hierarchal diffusion of agricultural practices during the Green Revolution. This is because many small farming communities would not be able to afford new technology for mechanization. Consequently, larger farms that could afford the tech prospered while rural areas struggled to compete, leading to an expanded wealth gap.

E Malthus did not predict that agricultural practices would advance greatly enough to support a quickly growing population. He did not know agricultural revolutions would make mass-production possible.

F Surplus food production by large commercial farms has made agricultural products cheaper globally due to economies of scale. These businesses can more easily produce lots of a product with little land, unlike small local farms. This means that people can buy products made by huge corporations more cheaply than products made locally.

G The Green Revolution was effective in reducing hunger in LDCs to a high degree because the development of high-yield crops allowed many starving populations to be fed more cheaply and efficiently. Making agricultural products more affordable to the lower economic class was a successful solution.

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1 ● Question 2 ○ Question 3 ○

Begin your response to each question at the top of a new page. Do not skip lines.

A. The concept of carrying capacity refers to the idea that earth has a specific number of people it can provide land and food for.

B. Humans have altered the enviromental sustainability of agricultural lands by planting crops that regenerate the soil in the off-season. This process allows farmers to continue to plant crops year after year without soil erosion.

C. Transportation technology has increased economies of scale in the agricultural sector of less developed countries by shipping products to core countries for a profit.

D. A likely Negative economic outcome of Green Revolution agricultural practices on rural communities is overfarming, which depletes soil richness and make land no longer arable.

E. One Weakness of Malthusian theory in predicting the relationship between food production and population growth in contemporary society is that it fails to account for the Industrial Revolution, which allowed food production to increase beyond the population growth.

F. Surplus food production has changed the global market for local agricultural products by importing these products from other countries rather than growing them.

G. Green Revolution agricultural practices were effective to a high degree in reducing hunger in less developed countries by providing more sustainable

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Question 1	Question 2	Question 3
●	○	○

Begin your response to each question at the top of a new page. Do not skip lines.

ways of farming, new irrigation systems, and providing a surplus of food.

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1 ● Question 2 ○ Question 3 ○

Begin your response to each question at the top of a new page. Do not skip lines.

The availability of food in the context of a growing world population is influenced by many social, enviomental, and economic factors.

A) Carrying capacity is the number of people that a region can support.

B) Humans have altered enviomental sustainability of agricultural lands by building large urban areas that minimize agricultural use of land to better support the people living there.

C) Transportation technology has increased economies of scale ~~for~~ less developed countries by allowing more opportunity for trade and investment which allows for ~~economic~~ economic growth.

D) A negative outcome would be that smaller rural communities may lose money to large agribusiness in the Green Revolution which would negatively impact their economy.

E) A weakness in Malthusian theory would be that it didnt properly take into account the technological growth in agriculture that allowed for mass crop production to provide for the rapidly growing population.

F) The surplus of food allows for more options in stores for produce, local organic products in more demand for being natural.

G) It helped reduce hunger in less developed countries to a high degree, mass production of food allowed for organizations to trade and give food/produce to countries in need.

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

Question 1

Note: Student samples are quoted verbatim and may contain spelling and grammatical errors.

Overview

In this zero-stimulus question, students were asked to examine how the availability of food, in the context of a growing population, is influenced by social, environmental, and economic factors. Students were asked to draw predominantly from Unit 5 (Agricultural and Rural Land-Use Patterns and Processes) as well from some selected topics in Unit 2 (Population and Migration Patterns and Processes). The main skills for this question are drawn from Skill Category 1 (Concepts and Processes) and Skill Category 2 (Spatial Relationships).

In part A students were asked to define the concept of carrying capacity.

In part B students were asked to describe one way that humans have altered the environmental sustainability of agricultural lands.

Recognizing that contemporary commercial agriculture has vastly transformed agricultural landscapes around the world, part C asked the students to explain how transportation technology has increased economies of scales in the agricultural sector of less developed countries.

The Green Revolution, characterized by the use of high-yield seeds, chemicals, and mechanized farming, is an important topic for the geographic understanding of agricultural patterns and processes. Part D asked students to explain a likely negative economic outcome of Green Revolution agricultural practices on rural communities.

The relationships between agriculture and changes in populations are key topics in human geography. Part E asked students to explain one weakness of Malthusian theory in predicting the relationship between food production and population growth in contemporary society.

Connecting geographic scales from global to local, part F asked students to explain how the surplus resulting from increased food production has changed the global market for local agricultural products.

Part G asked students to engage more rigorously with the geographic effects of the Green Revolution by asking students to explain the degree to which Green Revolution agricultural practices were effective in reducing hunger in less developed countries.

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Question 1 (continued)

Sample: A
Score: 7

The response to part A earned 1 point because it correctly defines the concept of carrying capacity as "the maximum amount of people that an area of land can support," as stated in A1.

The response to part B earned 1 point because it correctly describes one way that humans have altered the sustainability of agricultural lands. The response correctly describes that "humans have made agricultural lands less sustainable through the use of artificial pesticides that alter the surrounding environment, including the soil composition and the health of ecosystems." This response corresponds with the overuse or use of pesticides that harm ecosystems, as stated in B1.

The response to part C earned 1 point because it correctly explains how transportation technology has increased economies of scale in the agricultural sector of less developed countries. The response correctly explains that "transportation technology such as trucks, trains and boats have allowed less developed countries to sell their commodities abroad for a reasonable transport fee. Affordable product transportation makes producing a lot of a commodity cheaper, allowing LDCs to benefit from economies of scale." This response corresponds with trucks, trains, or shipping containers moving large quantities of crops, increasing production, as stated in C1.

The response to part D earned 1 point because it correctly explains a likely negative economic outcome of Green Revolution agricultural practices on rural communities. The response correctly explains that "many small farming communities would not be able to afford new technology for mechanization. Consequently, larger farms that could afford the tech prospered while rural areas struggled to compete, leading to an expanded wealth gap." This response corresponds with smaller farms closing and/or farmers selling land because they cannot compete with larger farms that can afford Green Revolution technologies, as stated in D2.

The response to part E earned 1 point because it correctly explains one weakness of Malthusian theory in predicting the relationship between food production and population growth in contemporary society. The response correctly explains that "Malthus did not predict that agricultural practices would advance greatly enough to support a quickly growing population. He did not know agricultural revolutions would make mass-production possible." This response corresponds with the improvement in agricultural technology, which increased food production at a rate that outpaced population growth, as stated in E3.

The response to part F earned 1 point because it correctly explains how surplus food production has changed the global market for local agricultural products. The response correctly explains that "businesses can more easily produce lots of a product with little land, unlike small local farms. This means that people can buy products made by huge corporations more cheaply than products made locally." This response corresponds with surplus food driving global prices down, resulting in less expensive items, higher sales or exports, or increased competition with other goods, as stated in F2.

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Question 1 (continued)

The response to part G earned 1 point because it correctly explains the degree to which Green Revolution agricultural practices were effective in reducing hunger in less developed countries. The response indicates "a high degree" and explains that the Green Revolution aided "the development of high-yield crops" which "allowed many starving populations to be fed more cheaply and efficiently." This response corresponds with food production increasing due to high-yield seeds, as stated in G1 and G2.

Sample: B
Score: 4

The response to part A earned 1 point because it correctly defines the concept of carrying capacity as "the idea that earth has a specific number of people it can provide land and food for." This response corresponds with the number of people a particular place, area, and/or the Earth can support, as stated in A1.

The response to part B earned 1 point because it correctly describes one way that humans have altered the sustainability of agricultural lands. The response correctly describes that "by planting crops that regenerate the soil in the off-season. This process allows farmers to continue to plant crops year after year without soil erosion." This response corresponds with the conservation of farmland, including erosion control, as stated in B11.

The response to part C did not earn a point because it incorrectly explains how transportation technology has increased economies of scale in the agricultural sector of less developed countries "by shipping products to core countries for a profit." The response would have earned the point if it had explained that trucks, trains, and/or shipping containers can move large and/or larger quantities of crops, increasing production and/or consumption, as stated in C1.

The response to part D did not earn a point because it incorrectly explains a likely negative economic outcome of Green Revolution agricultural practices on rural communities. The response explains that a likely negative outcome is "overfarming, which depletes soil richness and make land no longer arable." While the response does mention an outcome, it does not mention an economic outcome. The response would have earned the point if it had explained how the pollution of water, air, and/or soil resources harms economic productivity or livelihoods, as stated in D1.

The response to part E earned 1 point because it correctly explains one weakness of Malthusian theory in predicting the relationship between food production and population growth in contemporary society. The response explains that Malthusian theory "fails to account for the Industrial Revolution, which allowed food production to increase beyond the population growth." This response corresponds with improvements in agricultural technology that increased food production at a rate that outpaced population growth, as stated in E3.

The response to part F did not earn a point because it incorrectly explains how surplus food production has changed the global market for local agricultural products "by importing these products from other countries rather than growing them." The response would have earned a point if

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Question 1 (continued)

it had explained how increasing global sales of popular crops can decrease the number or type of local products for sale, as stated in F3.

The response to part G earned 1 point because it correctly explains the degree to which Green Revolution agricultural practices were effective in reducing hunger in less developed countries. The response indicated "a high degree" and explains that Green Revolution agricultural practices reduce hunger "by providing more sustainable ways of farming, new irrigation systems, and providing a surplus of food." This response corresponds with increased food production due to irrigation, as stated in G1.

Sample: C
Score: 2

The response to part A earned 1 point because it correctly defines the concept of carrying capacity as "the number of people that a region can support." This response corresponds with the number of people a particular place, area, and/or the Earth can support, as stated in A1.

The response to part B did not earn a point because it incorrectly describes a way that humans have altered the environmental sustainability of agricultural lands. The response incorrectly describes that humans have altered the environmental sustainability of agricultural lands "by building large urban areas that minimize agricultural use of land to better support the people living there." The response would have earned the point if it had described the overuse or use of synthetic fertilizers, pesticides, and/or herbicides that harm ecosystems, as stated in B1.

The response to part C did not earn a point because it incorrectly explains how transportation technology has increased economies of scale in the agricultural sector of less developed countries. The response incorrectly explains that "by allowing more opportunity for trade and investment which allows for economic growth." The response would have earned the point if it had more completely explained the increased economies of scale due to the way that trucks, trains, and/or shipping containers move large and/or larger quantities of crops, increasing production and/or consumption, as stated in C1.

The response to part D did not earn a point because it incorrectly explains a likely negative economic outcome of Green Revolution agricultural practices on rural communities. The response incorrectly explains that "smaller rural communities may lose money to large agribusiness in the Green Revolution which would negatively impact their economy." The response would have earned a point if it had explained that smaller farms may close because they cannot compete with larger farms that can afford Green Revolution technologies, as stated in D2.

The response to part E earned 1 point because it correctly explains one weakness of Malthusian theory in predicting the relationship between food production and population growth in contemporary society. The response correctly explains that Malthusian theory "didn't properly take into account the technological growth in agriculture that allowed for mass crop production to provide

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Question 1 (continued)

for the rapidly growing population." This response corresponds with improvements in agricultural technology that increased food production at a rate that outpaced population growth, as stated in E3.

The response to part F did not earn a point because it incorrectly explains how surplus food production has changed the global market for local agricultural products. The response incorrectly explains that "the surplus of food allows for more options in stores for produce, local organic products in more demand for being natural." The response would have earned a point if it had explained that increasing global sales of popular crops can increase local farm profitability and increase the number or type of local products for sale, as stated in F3.

The response to part G did not earn a point because it incorrectly explains the degree to which Green Revolution agricultural practices were effective in reducing hunger in less developed countries. The response indicates a degree but incorrectly explains that "mass production of food allowed for organizations to trade and give food/produce to countries in need." The response would have earned a point if it had explained that crop surpluses reduced food prices, making food items more accessible and/or more affordable, as stated in G2.

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